Claims

What is claimed is:

1. An orthogonal frequency division multiplexing receiver, comprising:

a demodulator configurable for receiving a passband signal including a plurality of symbols, at least one of the symbols being a reference symbol, and converting the passband signal to a baseband signal;

a carrier frequency offset (CFO) compensation circuit configurable for receiving the baseband signal and modifying a phase of the baseband signal in response to a first control signal;

a transformation circuit configurable for translating the baseband signal from the CFO compensation circuit into a frequency domain constellation;

an equalizer configurable for receiving the frequency domain constellation and modifying the frequency domain constellation based at least in part on the reference symbol; and

a CFO estimation circuit operatively coupled between an output of the equalizer and the CFO compensation circuit in a feedback configuration, the CFO estimation circuit being configurable for measuring a difference in phase error between at least two symbols received from the equalizer and for generating the first control signal, the first control signal being representative of the phase error difference.

2. The receiver of claim 1, wherein the at least two symbols received from the equalizer comprise consecutive symbols.

3. The receiver of claim 1, wherein the transformation circuit comprises a fast Fourier transform circuit.

4. The receiver of claim 1, wherein the CFO compensation circuit comprises a rotor configurable for receiving the first control signal and for shifting a phase of a symbol by an amount substantially equal to the phase error difference.

5. The receiver of claim 1, further comprising a filter coupled between the demodulator and the CFO compensation circuit, the filter being configurable to substantially remove an out-of-band gaussian noise component associated with the received passband signal.

6. The receiver of claim 5, wherein the filter is a low-pass filter.

7. The receiver of claim 1, further comprising a cyclic prefix (CP) decoder operatively coupled between the CFO compensation circuit and the equalizer, the CP decoder being configurable for removing a predetermined number of words from an end of each symbol in the received passband signal.

8. The receiver of claim 1, further comprising a slicer circuit coupled to the output of the equalizer, the slicer being configurable for measuring a signal constellation corresponding to a given symbol, determining a nearest match between a data sample in an expected constellation and a sample in the measured signal constellation, and generating an output data stream comprising samples representative of the nearest match.

9. The receiver of claim 8, wherein the slicer circuit comprises a quadrature amplitude demodulator.

10. The receiver of claim 8, further comprising a Viterbi decoder operatively coupled between equalizer and the slicer circuit.

11. The receiver of claim 8, wherein the first control signal is based at least in part on a difference between the data sample in the expected constellation and the sample in the measured signal constellation.

12. The receiver of claim 1, wherein the at least two symbols received from the equalizer comprise data symbols.

13. A method for estimating carrier frequency offset (CFO) in a wireless communication system, the method comprising the steps of:

receiving a passband signal including a plurality of symbols, at least one of the symbols being a reference symbol;

converting the passband signal to a baseband signal;

translating the baseband signal into a frequency domain constellation;

modifying the frequency domain constellation based at least in part on the reference symbol;

measuring a difference in phase error between at least two received symbols;

generating a first control signal, the first control signal being representative of the phase error difference; and

modifying a phase of the baseband signal in response to the first control signal.

14. The method of claim 13, wherein the at least two symbols comprise consecutive symbols.

15. The method of claim 13, wherein the step of translating the baseband signal into a frequency domain constellation comprises computing a fast Fourier transform (FFT) of the baseband signal.

16. The method of claim 13, further comprising the step of substantially removing an out-of-band gaussian noise component associated with the received passband signal.

17. The method of claim 13, further comprising the step of removing a predetermined number of words from an end of each symbol in the received passband signal.

18. The method of claim 13, further comprising the steps of:

measuring a signal constellation corresponding to a given symbol;

determining a nearest match between a data sample in an expected constellation and a sample in the measured signal constellation; and

generating an output data stream comprising samples representative of the nearest match.

19. The method of claim 18, wherein the first control signal is based at least in part on a difference between the data sample in the expected constellation and the sample in the measured signal constellation.

20. The method of claim 13, wherein the step of modifying a phase of the baseband signal comprises shifting a phase of a symbol by an amount substantially equal to the phase error difference.

21. A semiconductor device for estimating carrier frequency offset (CFO) in a wireless communication system, the semiconductor device comprising:

a demodulator configurable for receiving a passband signal including a plurality of symbols, at least one of the symbols being a reference symbol, and converting the passband signal to a baseband signal;

a carrier frequency offset (CFO) compensation circuit configurable for receiving the baseband signal and modifying a phase of the baseband signal in response to a first control signal;

a transformation circuit configurable for translating the baseband signal from the CFO compensation circuit into a frequency domain constellation;

an equalizer configurable for receiving the frequency domain constellation and modifying the frequency domain constellation based at least in part on the reference symbol; and

a CFO estimation circuit operatively coupled between an output of the equalizer and the CFO compensation circuit in a feedback configuration, the CFO estimation circuit being

configurable for measuring a difference in phase error between at least two symbols received from the equalizer and for generating the first control signal, the first control signal being representative of the phase error difference.